formly scalariform instead of pitted as in the Cycads. Dr. Stopes then takes issue with the opinion expressed in the well-known text-book of Scott to the effect that [in Cycadeoids]

the histological details of both wood and bast agree precisely with the corresponding structures in a recent cycad.

It is even stated that no plants agree with the Cycadeoids. In the case of long-known structures represented by such profuse material as the groups referred to, botanists should be able to agree more closely as to the facts.

The point involved is that while these groups agree in their general structures and present many points of histologic contact, neither is without singularities of its own. Chamberlain makes essentially the same statement as Dr. Scott. And I see no final reason for disagreement. The old cryptogamic wood is in the Cycads as completely lost as in the later Cordaiteans, but next the pith both the existing and fossil Cycads are in very essential agreement; and in both the passage from scalariform to pitted wood is the same. Perhaps the two groups might be considered divergent histologically were it not for the fact that *Stangeria* like the Cycadeoids is an essentially scalariform type and thus forms a connecting link on the one hand; while on the other, *Cycadeoidea micromyela* has pitted wood near the cambium layer.

The differences observed are therefore not so great as they at first sight appear. And such differences are found moreover in existing dicotyls. Thus in *Trochodendron,* which has pronounced growth rings, the spring wood presents the same scalariform type as the wood of the Cycadeoids; while in the related *Drimys* with rather suppressed growth rings the main body of wood is as strikingly pitted as in Cycads or *Araucaria.* The explanation is obvious when the seedling of *Drimys* is studied. There is the same transition from the scalariform to the pitted wood as in the existing and fossil Cycads. It may be remarked incidentally that were the stems of *Trochodendron* and *Drimys,* as well as other Magnoliaceæ, divested of their radial storage tissue the agreement with both the Cycads and Cycadeoids would be a striking one indeed. It is easy, however, to look upon this storage tissue as a comparatively modern structure. There is a definite suggestion that medullar reduction and profuse branching are in some way correlated with the development of thick-walled storage tissue by dicotyls. It is not necessary to enter further upon this topic at this time; but it is evident that the facts fully sustain Scott's simple form of statement as to the agreement histologically of the Cycad and Cycadeoid woods as based partly on the study of Solms and myself.

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THE RELATION BETWEEN AGE AND AREA IN THE DISTRIBUTION OF PLANTS

IN a discussion of the "Age and Area" hypothesis of Professor Willis, by E. W. Sinnott, in SCIENCE for November 9, 1917, the author very justly sets out with the contention that "other factors than age share in the area occupied by a species." Factors inherent in the plant itself, he tells us, such as hardiness, adaptability, growth habit and the like, play a very important part in determining distribution.

As a notable illustration in support of this statement, I would call attention to the rapid dispersion of a comparatively recent immigrant, the Japan honeysuckle (*Lonicera Japonica*) which now occupies a wider area in our southeastern states than the longleaf pine, and others of our "oldest inhabitants." My first recollection of this plant goes back to that now almost prehistoric time, vaguely recorded in the popular mind as "before the (civil) war," when it was known only as a garden plant. It continued in favor as an ornamental vine for piazzas and pergolas for a decade or so later, until it began to "run wild" at such a rate that it fell into disrepute for ornamental purposes, and is now the most aggressive and indomitable enemy with which our native plant population has to contend. Unlike the common herbaceous weeds of cultivation, it does not confine itself to roadsides and waste places, but invades the most secluded haunts of the wild flowers, strangling

or smothering under its rank foliage every green thing that stands in its way. It is no uncommon thing to see whole acres of haw thickets and other shrubby growth enveloped in its deadly meshes, and destined to slow extermination by this ruthless invader. Among its victims I have seen a remarkably fine specimen of "tree haw" (*Cratægus viridis*) 4 dm. in diameter, 12 m., more or less, in height, and about the same in spread of crown, reduced to little more than a mere leafless skeleton under the throttling grasp of its oppressor. So closely was it enveloped in the meshes of the woody twiner, that I had to cut my way through them with a hatchet in order to take the measurements given above.

While it prefers a rich, moist soil, as most plants do when they have the choice, this aggressive intruder can accommodate itself to almost any conditions, trailing like an humble creeper along the barren slopes of arid hillsides, rambling over wire fences along the borders of dusty roads, from the cool slopes on the plateau of Lookout Mountain, to the deepest ravines in the valley, and onward, over the granite hills of the Piedmont region, it has made itself at home. I could supplement this case with some equally striking instances of the rapid distribution of herbaceous plants, but it seems to me that the example of a shrubby species which, in spite of the fact that these are, in general, much less efficient travelers than herbs, has been able to naturalize itself, within the memory of people now living, over an area extending from the Gulf of Mexico to the estuary of the Hudson, and for a thousand miles up the great Appalachian Valley, may be taken as sufficient evidence that other factors than time influence the distribution of species over a given area.

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ORIGIN AND DEVELOPMENT OF THE PHOTOGENIC ORGANS OF PHOTURIS PENSYLVANICA

There are at present three conflicting views regarding the origin of the photogenic organs in insects. One view is that they are modified hypodermal cells, another that they are formed from both ectoderm and mesoderm, and lastly, that they are mesodermal, being derived from fat cells. Of these three views that of the fat-cell origin has been the most generally accepted. Moreover, recently two important papers have appeared which apparently definitely settle the question in favor of the theory of fat-cell origin. The first of these was by Vogel ('12), who worked on the embryology of *Lanopyris noctiluca,* the other by Williams ('16), based on a study of the embryology of our native species *Photuris pensylvanica.*

Unaware of Williams's work, I had undertaken, at the suggestion of Dr. W. A. Riley, a study of the embryonic development of the photogenic organs of *Photuris pensylvanica.*

During the summer of 1916, the eggs of this species required, on an average, 26 days to complete their development.

These eggs cut in sagittal sections 3 microns thick, showed in the fourteen-day embryos that the hypodermis on the ventrolateral portion of each side of the eighth abdominal segment, in its anterior region, was definitely thickened, due to proliferation and enlargement of its cells.

In the fifteen-day embryos the organ appeared as a distinct nodule which projected from the inner surface, though at this stage there was no evidence of any separation from the hypodermis. Further, it was found that there was no evidence of any relation between the fat cells and those of the nodule, in this, or the fourteen-day embryos.

In the sixteen- to seventeen-day embryos the organ is completely separated from the hypodermis, except at its two ends, where it remains attached. From Vogel and Williams's descriptions of the earliest condition of the light organ that they observed, one would be led to believe that it was the study of this stage of development, on which they based their conclusions regarding its origin. At this time the fat cells lie in rather close proximity to those of the light organ and somewhat resemble them.

In embryos nineteen to twenty days old, there occurs a differentiation of the cells of